EXHIBIT 6

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CSMRI

April 10, 1984
CSMRI Project NP-841074

Mr. Bart Hanford
Lee Mining Corporation
P.O. Box 266
Paxton, IL 60957

Re: Detoxification of North Lily/Dragon Consolidated Cyanide Leach Tailings

Dear Bart:

As part of the North Lily process evaluation, CSMRI was requested by Lee Mining to investigate detoxifying the North Lily cyanide leach residue. The details and the results of this preliminary study are discussed as follows:

The process flowsheet proposed by Lee Mining calls for dewatering and washing the cyanide leach residue on a horizontal vacuum belt filter. As an alternate to impounding the residue in a conventional tailings pond, detoxifying the material on the belt filter was considered. Conceivably, application of a hypochlorite solution to the final wash section of the belt would produce a cyanide-free residue. The residue could then be used to reclaim the site and the perpetual care problems associated with a tailings pond could be avoided.

The experimental work was based on the rationale that only the water-soluble species of cyanides are of concern. Prior studies conducted at CSMRI have shown that leaching similar residues for 2 hours in agitated vessels at 20% solids with water solubilizes approximately 95% of the water-soluble cyanides. The experiments performed for Lee Mining were based on this previous experience.

Two experiments were conducted in which 1.31 wt % NaOCl solution, in volumes equivalent to one cake displacement, were pulled by vacuum through simulated (repacked) filter cakes over a 90-second period. A 30-second vacuum dry period was applied, and the treated cakes were "cured" for 16 hours. The cured cakes were then reslurried with water and the filtrate analyzed for cyanides.

The filter cakes were supplied by Lee Mining from experiments conducted in their own laboratories. Reportedly, the cakes were representative of cakes that would be produced in actual practice. The test procedures and cake composition are described in the attached Exhibit 1.

The results of each test (duplicate conditions) show no water-soluble, chlorinatable species of cyanide remained in the "cured" filter cakes. The chemical consumption of NaOCl was determined to be on the order of 1.0 lb/ tons of dry residue. However, because some unreacted NaOCl remained with the solids, the total NaOCl consumed was found to be approximately 2.0 lb (100% reagent) per ton of dry solids.

The results of this program suggest that this detoxification procedure should be considered in lieu of conventional tailings impoundment.

Feel free to call if you have any questions or if we can be of any further assistance.

Sincerely,

Hal D. Peterson
Technical Consultant
Process Division

/rms
enc.

EXHIBIT 1

REMOVAL OF CYANIDE FROM TAILINGS

Tests 1 and 2

Purpose

To evaluate the effect of a controlled quantity of hypochlorite solution applied in a simulation of the final washing stage of a horizontal vacuum belt filter on cyanide solubility.

Sample Description

The sample was received as five moist laboratory filter cakes, approximately 5-in. diameter and ranging from 3/8 in. to 1/2 in. in thickness. The samples were sealed in double polyethylene bags. The initial net weight of the sample was 1,432 g.

Analytical Procedure

Analysis was conducted in accordance with ASTM (1976) Methods 335.1 and 335.2 for cyanides amenable to chlorination and for total cyanides, respectively. These procedures have been appoved by the Environmental Protection Agency (EPA) for determining the cyanide content of water samples.

These procedures were also applied to the moist filter cake head samples by providing for solids suspension (agitation) during the refluxing step of the analysis.

Separate analyses were conducted on the moist sample and on a water-leach solution. The water solution was obtained after 2 hr of agitated leaching with deionized water at ambient temperature and at 20 wt % solids. The leach slurry was filtered, and the filtrate from this treatment represented a water-soluble cyanide fraction as might occur through natural precipitation on untreated tailings.

The procedure used in analysis provided a lower detection limit of 4.0 ppm NaCN in the moist samples.

Sample Preparation and Analysis

The contents of the individual bags were composited and blended by hand using care to break up all lumps. The blended sample was rebagged to preserve the moisture content. Analytical and test samples were removed from the composite as needed.

EXHIBIT 1

Analysis

Initial Moisture	16.6%
Total Sample Analysis (based on moist sample):	
Total Cyanide, as NaCN	194.9 ppm
Nonchlorinatable Cyanide, as NaCN	102.0 ppm
Calculated Chlorinatable Cyanide, as NaCN	92.9 ppm
Water-Soluble Constituents (based on 2 hr of water leaching on moist sample):	
Total Cyanide, as NaCN	82.6 ppm
Nonchlorinatable Cyanide, as NaCN	35.2 ppm
Calculated Chlorinatable Cyanide, as NaCN	47.4 ppm

Test Procedure

Part A

Two-hundred gram samples of moist filter cake were used in each of two tests, simulating a hypochlorite washing step as the final stage on a vacuum belt filter. The samples were transferred to a horizontally positioned 0.05 ft^2 filter test leaf equipped with a sideboard. The samples were consolidated to represent a filter cake by tamping with a flat tool. Before applying vacuum, a 32-ml volume of 1.31% NaOCl solution was added to the surface of the sample, representing one liquid displacement of the moisture in the sample. Vacuum was applied gently to obtain a draw-down of the liquid just to the surface of the sample in 90 sec. This was followed by the application of full vacuum for a 30-sec period. Each of the above time periods were selected to represent reasonable operating conditions for a vacuum belt filter. The filtrates were collected, measured, and analyzed for NaOCl.

Part B

The treated filter cakes were recovered and sealed in plastic for 16 hr to represent a curing period feasible in plant operation.

The cured filter cakes were then repulped with deionized water and agitated at 20% solids and at ambient temperature for 2 hr. The final slurries were then filtered and thoroughly washed with water. The combined filtrates and wash solutions were measured and analyzed for total and nonchlorinatable cyanide by the standard procedures.

EXHIBIT 1

Results

Item	Test 1	Test 2
Moist Sample, g	200.0	200.0
Dry Sample, g	166.8	166.8
Moisture, %	16.6	16.6
Total Cyanide Input, ppm NaCN	194.9	194.9
Water-Soluble Total Cyanide Input, ppm NaCN	82.6	82.6
Final Residue, g	189.7	190.4
Dry Solids, g	170.4	169.3
Moisture, %	10.2	11.1
Water-Soluble Total Cyanide in Residue, ppm NaCN	12.5	15.3
Water-Soluble Nonchlorinatable Cyanide in Residue, ppm NaCN	16.1	16.3
Calculated Water-Soluble Chorinatable Cyanide in Residue, ppm NaCN	Nil	Nil
NaOCl Solution Input, ml (1.31% NaOCl)	32	32
NaOCl Solution Input, g	33.06	33.06
Wash Filtrate, ml	42	38
Wash Filtrate, g	42.4	38.4
NaOCl Contained, in filtrates, %	0.51	0.65
NaOCl Contained, in filtrates, g	0.22	0.25
NaOCl Consumed, g (100%)	0.20	0.17
NaOCl Consumed, lb (100%), ton dry solids	2.31	1.97